Quantum Theory-Inspired Search

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Classical Search

How Search Engines View the Problem

- A person is looking for information about A and says A.
- A variety of dimensions of context (the user, the task, the weather or the place) are ignored.
- A refers to unambiguous meanings (the user’s A is the book’s A).
- It also refers to one single, static unambiguous need.
- The user is uncorrelated from any other users.
- Information do not mutually interfere and the user’s assessment and behaviour are unconditioned.

The State-of-the-Art

- Ambiguity and superposition cannot be (easily) detected.
- Context modeling is ignored (it is too difficult).
- Query expansion adds noise and user effort.
- Correlations among users, information, queries are not modeled, or if they are, computation is too expensive or data are insufficient.
- Emergent or unexpected word associations cannot be modeled.
- Heuristic approaches are likely inconclusive.
- A unified framework to seamlessly integrate the dimensions of context is our approach.

Quantum Theory-Inspired Search

How Search Engines Shall View the Problem

- A person is looking for information about A but his expression is variegated in a superposition.
- A variety of dimensions of context (the user, the task, the weather or the place) are simultaneously modeled.
- Any expression refers to ambiguous meanings.
- It also refers to ambiguous needs (a father and his child wanting A may have incompatible aims).
- The user is entangled with other users due to history, habits, etc..
- Information mutually interfere and the user’s assessment or behaviour are conditioned.

The Art-of-the-State

- Information represented as superposed state.
- Variety of dimensions of context simultaneously modeled in a single abstract space.
- Prediction of emergent or unexpected word associations using quantum probability where probability distributions are states and observables are subspaces.
- Modeling correlations among dimensions of context using entanglement where correlations are inside observables and not only in states.
- Ranking algorithms that incorporate interference among the user’s assessments or behaviours so that information delivery depends on how the user’s interact with information.